SPONTANEOUS FRACTURE.

BY

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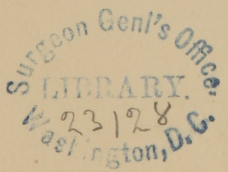

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FRACTURES of the shafts of the long bones, when occurring in connection with a slight, or almost insensible injury, are usually ascribed, and correctly, to one of four diatheses, or local diseases; viz.: Rachitis, Mollities, Caries or Cancer.

When occurring in bones not affected by either of these diseases, such lesions are quite rare, and must be classed by themselves. It is to this class we apply the term SPONTANEOUS FRACTURE.

CASE.

A young lady, of rather delicate health; pallid, lymphatic and predisposed to scrofula, fell upon the ice, and struck upon the left shoulder and arm. The injury was considered by herself a trivial one, and but little treatment was adopted. Dull pains in this arm, however, gradually came on, and recurred frequently, for seven weeks. There was no external sign of local injury during all this period. Gentle frictions and applications were used; the injury was regarded as a contusion, and the patient continued to follow her usual mode of life.

At the end of seven weeks she was, one morning, walking down a flight of stairs, being about to go out, when a book she was carrying in her left hand, fell to the floor, and she exclaimed to her companion that she had a violent pain, and could not raise her left arm.

When this occurred her right arm was towards the banisters, and her left entirely away from any object, or person. The book which she was carrying was of moderate weight.

She now complained of feeling faint, and was taken into a room adjoining the landing of the stairs where the accident happened, and laid upon a bed.

Having been sent for, I saw her soon afterwards, and found a fracture of the shaft of the left *humerus*, near the surgical neck. The signs of this fracture were—deformity; bony crepitus when the arm was lengthened and rotated; no rotation of the head with the shaft; a positive hinge in the upper third of the shaft;

pain and entire helplessness. There was no bruise, no swelling, reddening, fluctuation, or sinus. The bone did not appear at all enlarged. The ends of the fracture felt rounded off and pointed.

Treatment.

A moderate pad of soft cotton wadding was put in the axilla; a straight splint, padded, was applied to the inside of the arm; a shoulder-cap splint of Ahl, padded, compressed the deltoid muscle, and extended down to the external condyle. Extension having been made, the splints were bandaged on. The double triangle of Mayor was now applied, by means of two large handkerchiefs, the apices of the triangle meeting at the elbow.

This apparatus was continued for four weeks, with occasional slight re-adjustment. At the end of four weeks the splints were taken off, and the union was found to be good; the head of the bone rotating with the shaft, and a very considerable, ovoid-shaped mass being felt around the seat of fracture.

The arm was supported in a sling for two weeks more, and then left to itself. It had thus united, firmly and without pain, in about the usual length of time which bones of that size require to repair a break.

Remarks.

Neither before, nor since that time, now eighteen months ago, has the patient experienced any similar fractures, or a tendency to them. Her health is moderately good; and she is, and has been, of active habits.

The fact of fracture is beyond question; the immediate exciting cause was absolutely nothing in the way of effort, or injury. The book fell because the arm broke; just as old people sink down prostrate because the neck of the femur gives way in advanced age.

Our patient was young, and had none of the symptoms or antecedent causes to which a tendency to fracture is ascribed. She had experienced a fall, followed by continuous local pain. Is it not fair to conclude that the blow had given rise to local inflammation of the bone, followed by absorption, atrophy and fracture?

If this be a correct explanation, the prompt repair of the injury is remarkable. It would seem as if Nature had endured progressive atrophy, and forborne resistance to disintegration, until the bone gave way and the rupture was complete, when immediately her forces were roused by the shock, and were set at work actively to repair damages.

We have in this, perhaps, an explanation of the large callus which was formed; for, although the misplacement of the bones was remedied by splints, so that the arm came out of the apparatus of good length, even and uniform with the other, yet the provisional callus was as large as we see in very badly misplaced fractures. It is now well known that in fractures perfectly apposed and retained, union takes place from surface to surface, by the Haversian canals, without any marked provisional callus; while in fractured bones whose ends have shot by each other an enormous ball of provisional callus is thrown out.* This plastic material is from three sources: the Haversian canals and periosteum of the medullary cavity (medullary membrane), the periosteum outside the bone, and even from the connective tissues around it.†

Does it not then seem probable that in this fracture from degeneration and atrophy, there was little power of repair in the fractured ends, and therefore, although the ends were kept well in apposition, the repair took place from the outer periosteum and surrounding tissues, and by a large provisional callus? Just so we see Nature, by a supreme effort, patch up the dangling leg of the lamb, or chicken, which is kept in motion by the animal, and repairs with an enormous callus.

In a similar way I have seen a fractured clavicle in a child, although never rested and never treated, because not recognized, recover while in motion, with a large provisional callus.

The singularity of the accident, the absence of exciting cause and the peculiarity in the repair, combine to render this a case of much interest, although, as we shall presently show, it is not a unique one.

I had fresh in mind the case of an old lady who was brought to the Hospital, having fractured the shaft of the femur in the middle, by being lifted and turned in bed. In this case the limb was put in an apparatus and kept at perfect rest, for six weeks. A projection forming around the fracture was thought to be a callus, and our disappointment was great when it was found that no union had taken place, and to discover, after death, a mass of osteoid cancer filling and thinning the shaft of the bone, and projecting in every direction around the fracture. It was natural, then, that much solicitude should be felt as to the result in this case of spontaneous fracture, lest it should be found that cancer were the cause of the trouble.

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* Hamilton on Fractures.

† Billroth, Surgical Pathology. Ollier, Regeneration of Bones.

It may be useful to glance, for a moment, at the other causes of spontaneous fractures, and to compare other cases with our own. These causes may be enumerated, as follows : —*

Rachitis.	Scrofula.
Mollities.	Scurvy.
Cancer.	Gout.
Caries.	Atrophy.
Necrosis.	Local Inflammation.
Syphilis.	Muscular Action.

Rachitis and mollities both affect the bones generally. They are constitutional diseases. Rachitis, characterized by a deficiency of earthy salts, by flexibility and frequent fractures, is an affection of childhood and youth. Mollities (or fragilitas) is a general softening — often likened to a fatty degeneration — of the osseous tissues, which gives rise to repeated fractures, and usually comes on at, or beyond the middle period of life. It is, not infrequently, confounded with osteoid cancer, and with tubercular deposits in the bones. Cancer is, however, usually a growth from the cancellous tissue of the expanded ends of the long bones; and, originating in the medulla, grows outwards, and destroys the shaft of the bone by thinning, disintegration, and finally fracture.

Syphilitic disease, on the other hand, often renders the bones more dense and thick, though it sometimes destroys them by an eroding caries.

The ordinary forms of scrofulous disease affect the epiphyses, articular cartilages and joints, more frequently than the shaft of the bones.

Caries is accompanied by abscess and ulceration of the soft parts. Necrosis is preceded by pain, abscess and sinus, and ends in the formation of sequestra. In scurvy we have a sponginess and fragility from mal-nutrition; in gout or rheumatism, characteristic changes in the joints.

"Inflammation, fatty degeneration, disuse and injury," says Mr. Holmes, "are frequent causes of atrophy; and there is also a simple atrophy, in which the composition of the bone is unaltered, and where the amount of bony tissue becomes gradually less and less, until the bone is no longer strong enough to resist slight violence."† Atrophy is one of the most common causes of spontaneous fracture. "Atrophy from inflammation is a condition illustrated by many morbid preparations, though it does not attract much attention in practice."‡

"All bones, in a state of inaction (as in the long enforced rest of compound fractures), lose a great part of their phosphate of lime."§

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* Malgaigne, Hamilton, Holmes.
† Holmes's Surgery.
‡ Humphrey on the Skeleton.
§ Brodie, "Lectures on Pathology."

Local inflammation, then, the result of injury, especially when there is also enforced rest from pain, may lead to atrophy and spontaneous fracture.

Violent muscular action may occasion fracture of bones. In certain states of fatty degeneration of the bones, even moderate contractile force may suffice, as, for example, the fracture of the ribs by coughing.

"The bones most frequently broken by muscular force are the patella, os calcis, olecranon, humerus, and femur. There are also a few cases of fractures of the sternum, ribs, clavicle (four only reported), the forearm, and even the tibia. In these cases there must either be a preceding alteration of the osseous tissue, which has decreased its power of resistance, or an abnormal increase of the muscular force, as in the convulsions of epilepsy."*

In certain degenerations, as in mollities, a peculiar substance allied to albumen has been found in the urine. In the insane, there is not only great fragility of the bones, but also an explanation of it is found in the abnormally large excretion of phosphates which occurs in the urine. The same is true of caries and necrosis.

After having briefly reviewed the various morbid conditions in which spontaneous fracture may occur, we can hardly refer our case to any of them except that of local inflammation, the result of injury, followed by atrophy.

For rachitis, mollities, cancer, scrofula, syphilis, scurvy and gout are all constitutional diseases affecting many independent parts, or spreading to neighboring ones; while caries and necrosis have external manifestations which are wanting in our patient.

In describing the conditions of spontaneous fracture, Malgaigne † says: —

"But a cause, much more frequent, and one which has been too often overlooked, is a local inflammation of the osseous tissue. I call thus, by conjecture, an affection which exhibits itself externally in dull pains, which the patient refers to a previous contusion, or to an attack of rheumatism; rarely severe enough to excite constitutional disturbance, and hardly arousing the attention, until finally, on a very slight effort, a fracture occurs at the seat of the pain.

"I have seen a young man of twenty years, strong and of good constitution, fracture his femur by falling from the upright position down upon level ground; for some weeks previous he had experienced, at the seat of fracture, pains which he had referred to rheumatism."

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* Malgaigne, Fractures and Dislocations.
† Op. cit.

"A majority of the fractures of the long bones by muscular action, are prepared for, so to speak, in this way. Nicod gives two remarkable cases. A journeyman carpenter had, for a month, rheumatic pains, quite acutely, in the left arm; a fracture took place, while he was pressing forcibly upon the handle of a bit-stock which he was turning with the right hand. A laborer broke his right arm while throwing a stone; it appeared that he had always enjoyed good health, until a month previous, when pains in his right arm increased so rapidly as to prevent his working; but there was never fever, nor loss of appetite a single day." "I could cite similar facts as to fractures of the patella.

"Therefore, whenever we are obliged to subject the bones to a considerable strain, as in the reduction of old dislocations, I regard it as a very important precaution to assure ourselves beforehand, whether the patient has experienced fixed pains at any point of the dislocated limb."

It will readily be seen how important a bearing the causation of spontaneous fractures may have in certain medico-legal questions.

Contrasting spontaneous with ununited fractures, it might be said that the former began in an atrophy and ended in reparation; while the latter began in a normal state by an accidental break, and ended in an atrophy, without power of repair.

We append the following case, in point, from the Report of the Clinical Society, taken from the "London Lancet" of December 3d, 1870.

"Mr. Durham related a remarkable case of Spontaneous Fracture of the Femur. When first seen by him the patient, a professional man, was seated, half dressed, in an easy-chair. He thought himself capable of walking about, and was surprised to find this impossible. The right femur was found broken at the junction of the upper and middle thirds, the limb being shortened by three inches. Three months previously the patient had fallen down stairs and hurt his thigh; but he soon felt nothing of the injury, which he thought a trifling one. Seven weeks later, however, he began to have aching pain in the thigh, which was considered and treated as neuralgia; and when this had lasted three weeks, he felt, on going to bed one night, a sudden increase in the pain, and fell on to his bed in great agony. Next morning he could not move the thigh, which was much swollen. He was quite unconscious of having subjected the limb to any sudden strain.

"After a few days the swelling and pain diminished, and he got up, but could not walk about; and it was about ten days after, that Mr. Durham, visiting him for the first time, in consultation, found his thigh broken. Under treatment the bone united; in the course of four months the patient could move about; two months later he returned to professional work. He remains quite well. Mr. Durham thought it probable that at the time of the fall some injury of the bone had taken place, which had been followed by gradual interstitial degeneration and absorption of bony tissue, instead of healthy repair, and had led to spontaneous fracture of the bone. The patient had, it seemed, been subjected to great worry, and wear and tear of brain, and Mr. Durham suggested the relation which may exist between overwork or excitement of brain and defective nutrition of bone."

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